REMARKS

Claims 22 - 33 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

CLAIM OBJECTIONS

The Examiner has objected to Claims 24 and 25 a light reflective device cannot emit a light ray. Applicant, however, respectfully asserts that a light reflective device can emit a light ray as described on page 14, lines 10-14 of the specification:

> "The light reflective means may emit a light ray or a color light ray. To emit a light ray, a fluorescent plate may be employed, and to emit a color light ray, a hologram may be employed. With this arrangement, the diffusion displays in the transmissive display mode and reflective display mode are colored, providing an easy-to-see feature to the display device."

In view of this disclosure, Applicant respectfully requests that the objection to claims 24 and 25 be reconsidered and withdrawn.

REJECTION UNDER 35 U.S.C. § 103

Claims 22 – 27 and 30 – 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Rudisill et al. (U.S. Pat. No. 5,339,179) in view of Barbier et al. (U.S. Pat. No. 5,479,279). This rejection is respectfully traversed.

The Examiner alleges that Rudisill discloses a display device with a liquid crystal panel, a liquid crystal layer between two substrates, a polarizer on one side of the

panel, and a first reflective polarizer on the other side of the panel. Upon review of Rudisill, however, no disclosure of a reflective polarizer could be located. More specifically, Rudisill only teaches polarizers that either absorb or transmit light beams.

In contrast, the claimed invention called for in claim 22 discloses a first polarizing splitter device disposed on one side of the polarization axis varying device which transmits a light ray component linearly polarized in a first direction while reflecting or absorbing a light ray component linearly polarized in a predetermined direction different from the first direction. As such, the first polarizing splitter device called for in claim 22, is different from those taught in Rudisill. That is, the claimed invention calls for a polarizing splitter device that reflects, absorbs, and transmits a light ray component. The claimed invention, therefore, is different from that taught by Rudisill.

Beginning at page 8, line 6 of the application, the operation of the claimed invention is described:

> "Fig. 2 illustrates the display device of the present invention under the presence of an external light. The display device employs TN liquid crystal display panel 140 as polarization access varying means. The upper polarizer 130 is disposed on top of the TN liquid crystal display panel 140. Arranged beneath the TN liquid crystal display panel 140 are the reflective polarizer 160, a light diffusion layer 150, a light source 190 and a reflective layer 200 in that order from below. The polarization axis of the polarizer 130 is perpendicular to the polarization axis of the reflective polarizer 160.
>
> In a voltage applied area 120 on the right-hand side, a natural ambient light 121 is linearly polarized in a direction parallel with the page by the polarizer 130, and is then transmitted through the TN liquid crystal display panel 140 with no change in polarization direction. The light ray is

then reflected by the reflective polarizer 160, as a light ray linearly polarized in a direction parallel with the page, is transmitted through the TN liquid crystal display panel 140 with no change in polarization direction, and then exits from the polarizer 130. Since the reflective polarizer 160 reflects light in a specular reflection fashion, the display device presents a bright display on the screen only with the light ray deflected from the reflective polarizer as seen at a right viewing angle to a screen. The display device presents a dark display onscreen when the light ray reflected from the reflective polarizer is viewed at viewing angles other than the right angle to the screen.

In a nonvoltage applied area 110 on the left-hand side, a natural ambient light 111 is linearly polarized in a direction parallel with the page by the polarizer 130, and is twisted in a polarization direction 90° by the TN liquid crystal display panel 140, becoming a light ray linearly polarized in a direction perpendicular to the page. The light ray is then transmitted through the reflective polarizer 160 and is partly transmitted through the light diffusing layer 150. The light ray transmits through the light diffusing layer 150 is reflected by the reflective layer 200, is again transmitted through the light diffusing layer 150, and exits towards the reflective polarizer. Part of the light ray transmitted through the reflective polarizer 160 is diffused through and reflected by the light diffusing layer 150, and then exists towards the reflective polarizer 160. The light ray linearly polarized in a direction perpendicular to the page, exiting to the reflective polarizer and transmitted again through the reflective polarizer 160, is twisted in a polarization direction 90° by the TN liquid crystal display panel 140, becoming a light ray linearly polarized in a direction parallel with the page, and is then transmitted through the polarizer 130. Since the light ray transmitted through the polarizer 130 is a light ray diffused through the light diffusing layer 150, it is white in all directions.

In the voltage applied area 120, the light reflected by the reflective polarizer 160 is in exiting light ray 122, while in the nonvoltage applied

area 110, the light transmitted through the reflective polarizer 160 is in exiting light ray 112, which looks white from all directions, as a result of a diffusion action by the light defusing layer 150. Under the external light, the display device prevents a positive with a dark (black) display with a white background in almost all directions. However, a positive with a specular display with a white background is obtained in the reflection direction of the light ray reflected by the reflective polarizer.

Referring to Figure, 3, the liquid crystal display device remains unchanged from the one shown in Figure 2. In the voltage applied area 120 on the right-hand side, a light ray component lined with the polarization direction of the reflective polarizer 160, out of light ray 125 from light source, is transmitted through the reflective polarizer 160 as a light ray linearly polarized in a direction perpendicular to the page. The light transmitted through the reflective polarizer 160 is then transmitted through the TN liquid crystal display panel 140 with no change in polarization direction, and is absorbed by the polarizer 130. The resulting display thus appears black.

In the nonvoltage applied area 110 on the left-hand side, a light ray component aligned with the polarization direction of the reflective polarizer 160, out of a light ray 150 from the light source, is transmitted through the reflective polarizer 160 as a light ray linearly polarized in a direction perpendicular to the page. The light ray transmitted through the reflective polarizer 160 is then twisted in a polarization direction 90° by the TN liquid crystal display panel, becoming a light ray linearly polarized in a direction parallel with the page, and is then transmitted through the polarizer 130.

With the light source lit, the voltage applied area 120 presents a dark display as a result of light absorption through the polarizer 130 while the nonvoltage applied area 110 presents a light display as a result of a light transmission through the polarizer 130. A black positive with a light source color background is presented when the light source 190 lights. In conclusion, a positive display is presented regardless of whether the

display device is under the external light or with the light source light." (emphasis added)

Rudisill, on the other hand, teaches polarizers that either absorb or transmit light beams. Referring to Column 3, line 61 of Rudisill through Column 4, line 22, the operation of Rudisill's liquid crystal display is described:

> The liquid crystal layer (LCL)10 is a twisted pneumatic liquid crystal layer (TN-LCL). The crystals tend to align themselves with the orientation of the rub texture of the surface of polyimide layers 24 and 26. The surfaces of the polyimide layers 24 and 26 are oriented in alignment with polarizers 30 and 28, respectively. Since the crystals adjacent the polyimide layers tend to align with the surface texture of the layers, the change of crystals in the TN-LCL twist from front to back layers (approximately 270° in the preferred embodiment). Linearly polarized light is rotated (270°) by the crystals as it passes through the LCL from front to back. Since the polyimide layers are aligned with the polarizers, the light will pass through both polarizers 28 and 30. Therefore, the LCD appears light or bright when the LCL is in a relaxed state.
>
> When a voltage is applied between two conductor strips 20 and 22, the crystal chain in the TN-LCL will untwist at the intersection between the two strips. Polarizers 30 and 28 are oriented at an angle approximately 90° to each other. Therefore, light passing through the untwisted portion of the LCL is not rotated, and is sharply attenuated by the crossed polarizers. The portion of the LCD at the intersection of the energized strips 20 and 22 appears dark. <u>To summarize, when the TN-LCL is in a relaxed state, light passes through the combination of two polarizers and the ICL; when TN-LCL is energized at a given spot or picture element, light does not pass through the combination of two polarizers and the LCL.</u> (emphasis added)

As can be seen from the disclosures of the present invention and Rudisill, set forth above, the principles of operation of each of these liquid crystal display devices is different. That is, the claimed invention calls for a first polzarizing splitter device that transmits, reflects, and absorbs a light ray component. In contrast, Rudisill merely teaches polarizers that either absorb or transmit light. Since these two principles of operation are different, the claimed invention is different from that taught by Rudisill. As such, the claimed invention would not have been obvious in view of this teaching by Rudisill.

Further, with respect to Barbier, there is also no teaching of a reflective polarizer that absorbs, reflects, and transmits a light ray component. Since neither Rudisill nor Barbier teaches a liquid crystal device that includes a reflective polarizer that transmits, absorbs, and reflects a light ray component, the claimed invention would not have been obvious.

Still further, the number of at least one of dimples and projections provided on the viewer's side of the lighting device cancel a light ray component linearly polarized in a second direction that is returned and reflected at the second polarizing splitter device. Also, the second polarizing splitter device transmits a light ray component linearly polarized in a predetermined direction different from the second direction from the cancelled light ray component. Both Rudisill and Barbier are silent with respect to such a structure that accomplishes the above recycling of light. As such, the claimed invention would not have been obvious.

Claims 28 – 29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudisill and Barbier as it applied to claim 27 above (for claims 28 – 29) and further in view of Weber et al. (Weber) (U.S. Patent No. 5,686,979).

Claims 28 and 29 are dependent on claim 22, addressed above. These claims are not obvious for at least the same reasons. Further, with respect to claim 32, neither Rudisill nor Barbier teach a reflective polarizer as set forth above. As such, it would not have been obvious to combine the teachings of Rudisill, Barbier, and Weber to arrive at the claimed invention.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: March 2, 2004

By: _____
G. Gregory Schivley, Reg. No. 27,382
Bryant E. Wade, Reg. No. 40,344
Jason A. Heist, Reg. No. 51,797

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

GGS/BEW/JAH/mb